

**CLAIMS**

**What is claimed:**

1. A method for defining tone signals in a voice activity detection (VAD) device, comprising:
  - defining a threshold for zero amplitude change;
  - calculating a zero crossing rate of a signal;
  - extracting a set of parameters from a plurality of duration periods of said signal;
  - defining a tolerance threshold between said plurality of duration periods when a zero amplitude change occurs;
  - calculating a maximum difference between said plurality of duration periods; and
  - comparing said maximum difference with said threshold.
2. The method of claim 1, wherein said calculating said zero crossing rate comprises:
  - determining, for a signal sample with a zero value amplitude at the zero crossing point, a tangent value of the sample; and
  - defining the zero value amplitude as a non-zero value depending upon the tangent of said sample point.
3. The method of claim 2, wherein said defining comprises defining said zero value

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amplitude according to whether said tangent is positive or negative.

4<sup>x</sup> The method of claim 1, wherein said calculating said maximum difference comprises calculating a product between the sample and the sample's adjacent sample in a group of signal samples.

5<sup>x</sup> The method of claim 1, further comprising:  
defining a range of said signal that does not contain a zero crossing point;  
comparing said range with said threshold.

6<sup>x</sup> The method of claim 1, wherein the maximum difference is calculated between a sum of all said durations and a single said duration.

7<sup>x</sup> The method of claim 1, wherein the maximum difference is calculated using a mean difference between a sum of all said durations and a single duration.

8<sup>x</sup> The method of claim 1, wherein the method defines tone signals according to an International Telecommunications Union (ITU) recommendation G.729 Annex B VAD device.